

1a $A \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} \quad B \begin{pmatrix} 7 \\ -4 \\ 13 \end{pmatrix} \quad C \begin{pmatrix} 8 \\ -6 \\ 15 \end{pmatrix}$

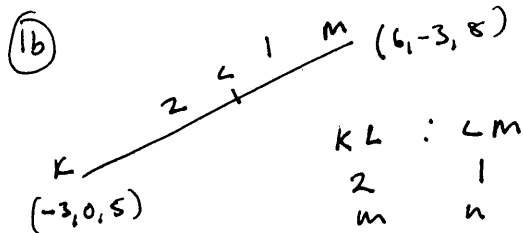
$\vec{AC} = c - a$

$\begin{pmatrix} 8 \\ -6 \\ 15 \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} = \begin{pmatrix} 5 \\ -10 \\ 10 \end{pmatrix} = 5 \begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix}$

b. $\vec{AB} = b - a$

$\begin{pmatrix} 7 \\ -4 \\ 13 \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} = \begin{pmatrix} 4 \\ -8 \\ 8 \end{pmatrix} = 4 \begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix}$

$\begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix} \quad 5\vec{AC} = 4\vec{AB}$
and A is common Point
then ABC are collinear



$KL : LM$
 $2 : 1$
 $m : n$

$L = \frac{mb + na}{m+n}$

$L = \frac{2b + a}{3}$

$\vec{KL} = L - K$

$\vec{LM} = M - L$

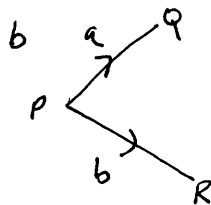
$L = 2 \begin{pmatrix} 6 \\ -3 \\ 8 \end{pmatrix} + \begin{pmatrix} -3 \\ 0 \\ 5 \end{pmatrix}$

$L = \begin{pmatrix} 12 \\ -6 \\ 16 \end{pmatrix} + \begin{pmatrix} -3 \\ 0 \\ 5 \end{pmatrix} = \begin{pmatrix} 9 \\ -6 \\ 21 \end{pmatrix}$

$L = \frac{1}{3} \begin{pmatrix} 9 \\ -6 \\ 21 \end{pmatrix} = \begin{pmatrix} 3 \\ -2 \\ 7 \end{pmatrix}$

co-ord L = (3, -2, 7)

$\begin{pmatrix} 3 \\ -1 \\ 1 \end{pmatrix} \times \begin{pmatrix} 2 \\ 0 \\ 3 \end{pmatrix} = \begin{pmatrix} 6 \\ 0 \\ 3 \end{pmatrix} = 9$



$\cos \theta = \frac{a \cdot b}{|a||b|}$

$\cos \theta = \frac{9}{|a||b|}$

$|a| = \sqrt{3^2 + (-1)^2 + 1^2}$
 $= \sqrt{9 + 1 + 1}$
 $= \sqrt{11}$

$|b| = \sqrt{2^2 + 0^2 + 3^2}$
 $= \sqrt{4 + 9}$
 $= \sqrt{13}$

$\cos \theta = \frac{9}{\sqrt{11}\sqrt{13}} = 0.752677$

$\theta = 41.14^\circ$

Outcome 2

3a $\frac{dy}{dx} (-5 \sin x) = -5 \cos x$

b $\frac{dy}{dx} \left(\frac{1}{3} \cos x \right) = -\frac{1}{3} \sin x$

(4) $f(x) = (x+4)^{-3}$

$f'(x) =$

Let $u = (x+4)$ $y = u^{-3}$

$\frac{du}{dx} = 1$

$\frac{dy}{du} = -3u^{-4}$

$\frac{dy}{dx} = \frac{du}{dx} \times \frac{dy}{du}$

$\frac{dy}{dx} = -3u^{-4} \times 1$

$\frac{dy}{dx} = -3(x+4)^{-4}$

$= -\frac{3}{(x+4)^4}$